



Astrophysics Division

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SMD Guiding Principles

- To advance the priorities of all four decadal surveys.
- To get more from our budgets through better management and investments in R&A.
- To help the Vision for Space Exploration succeed (e.g., fostering a lunar science community).



Astrophysics Directions

- Numerous recent community reports call for re-establishing balance among small, medium, and large missions in the Astrophysics program:
 - Astronomy & Astrophysics Advisory Committee 2007 Annual Report: *"The balance between small, medium and large programs in the NASA Astrophysics Division has been undermined. The AAAC recommends that the funding "wedge" in FY09/10 be used to add some funding for R&A and small missions, to rebalance the program."*
 - NRC 2007 NASA Astrophysics Program Assessment report: Recommendation #1: *"NASA should optimize the projected scientific return from its Astrophysics Program by ensuring a diversified portfolio of large and small missions that reflect the scientific priorities of the decadal review and by investing in the work required to bring science missions to their full potential: e.g., technology development, data analysis, data archiving, and theory."*

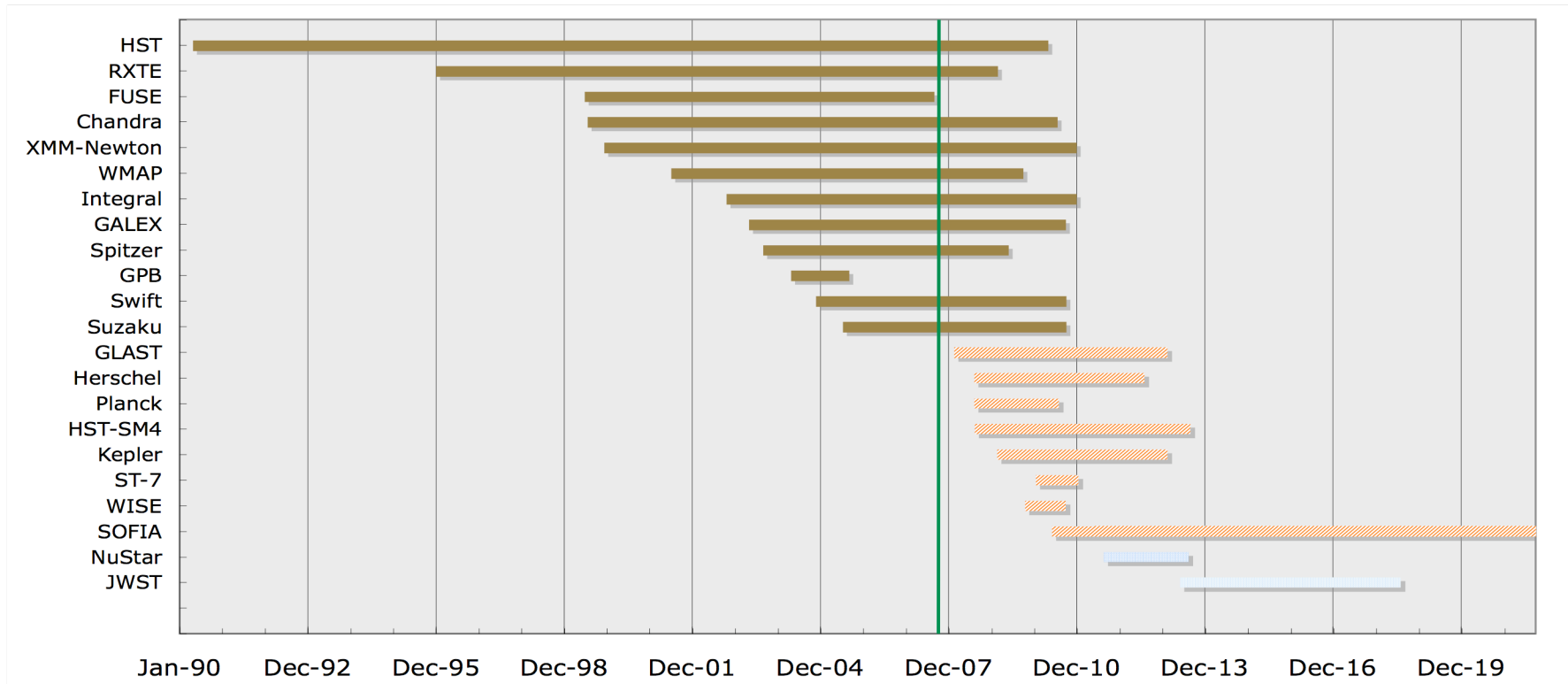


Astrophysics Division

What's New

- Exciting new capabilities to launch within two years: **GLAST, HST-SM4, Kepler, Herschel/Planck, WISE**
- New SMD focus on Strategic Investments in: Research and Analysis, Data Analysis, and Suborbital Opportunities.
 - Re-instatement of NuSTAR mission
 - Next Small Explorer (SMEX) AO:
 - pre-proposal conference Nov. 6 in Washington DC (NOI Nov. 16)
 - Proposals due January 15, 2008
 - Mission cost cap of \$105M (FY08\$), not including launch vehicle
 - Mission of Opportunity allocation of \$70M (FY08\$)
 - Selections anticipated 4 months after proposals due
 - Approximately 6-8 Phase A concept studies
 - Anticipate selecting up to 3 for flight
 - New experience standards for PI, but only PI
 - Strategic Mission Concept Studies NRA (proposals due Nov 20)

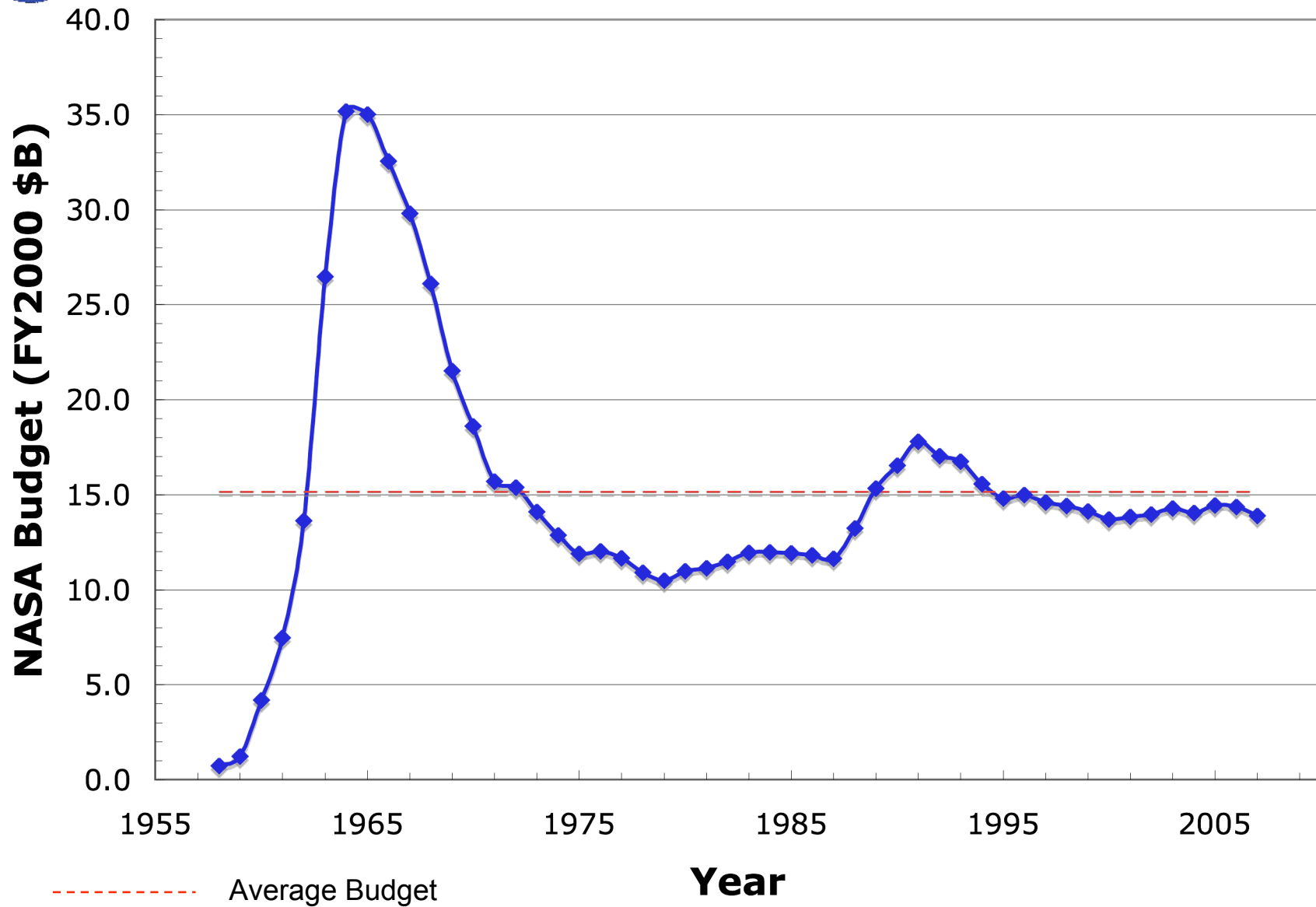
Astrophysics Timelines



Tan: mission in development, blue: mission in formulation

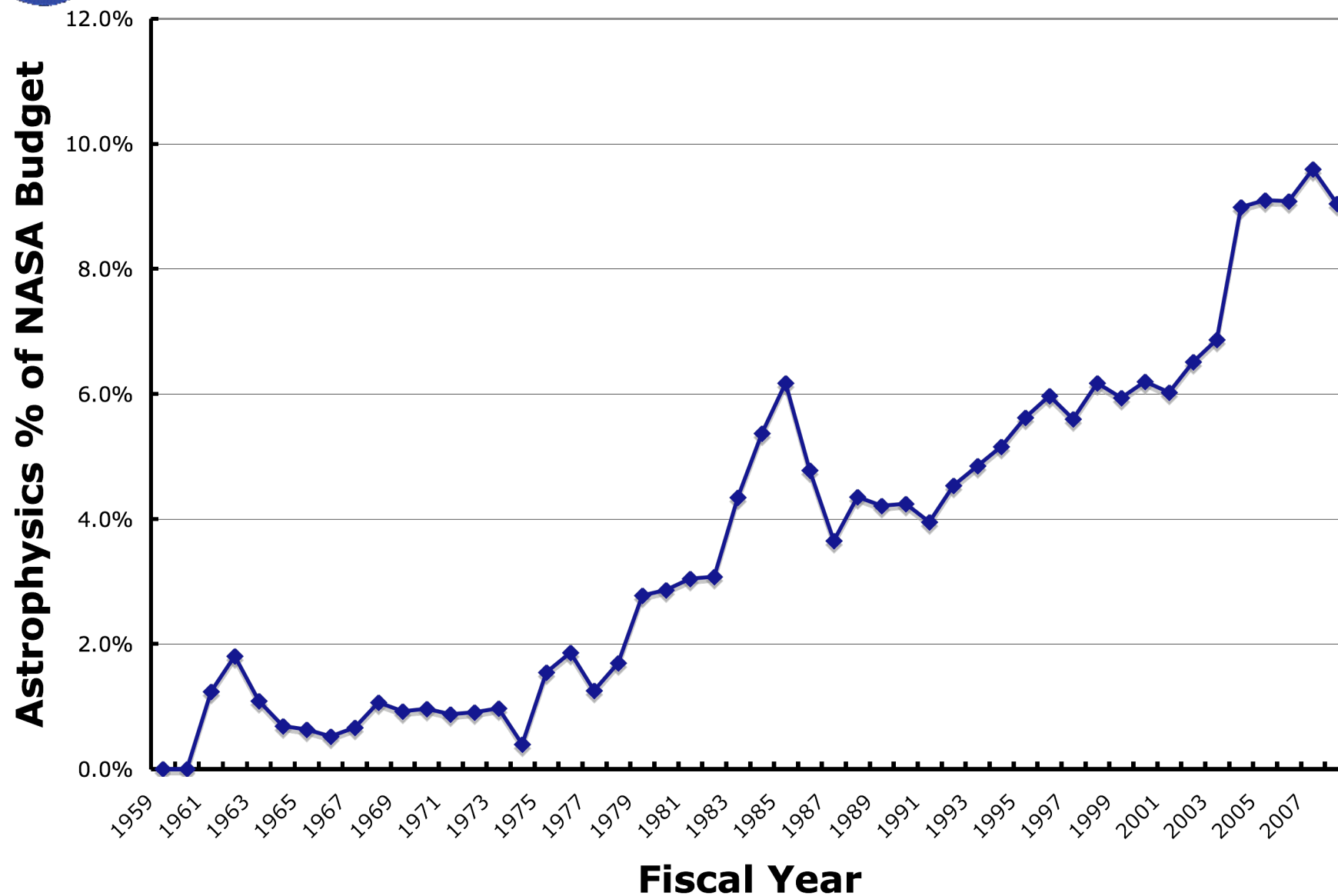


NASA Funding History (\$B FY2000)

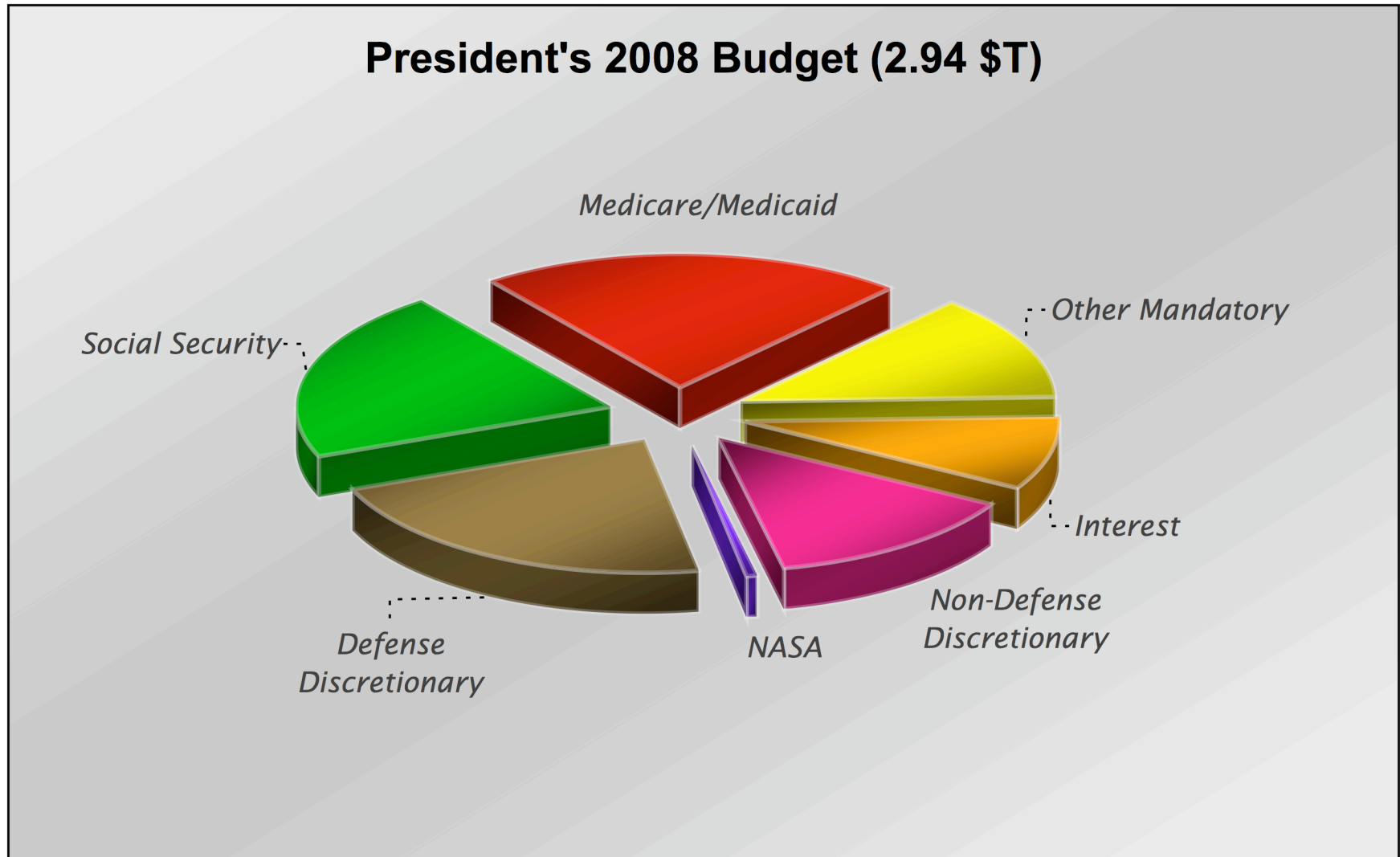


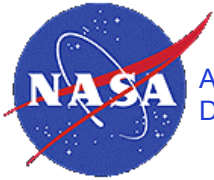


We Are Successful !



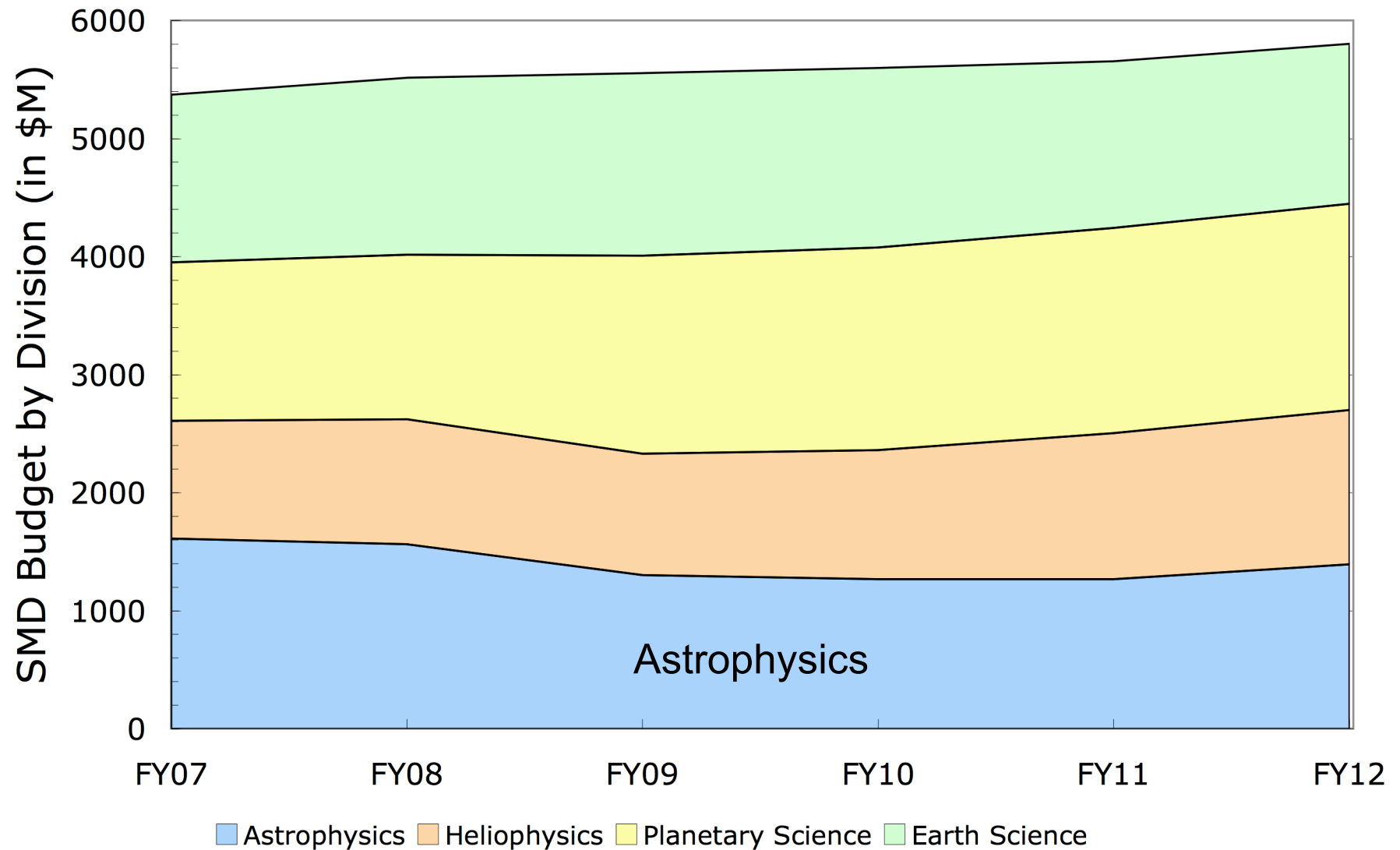
FY2008 Federal Budget Context





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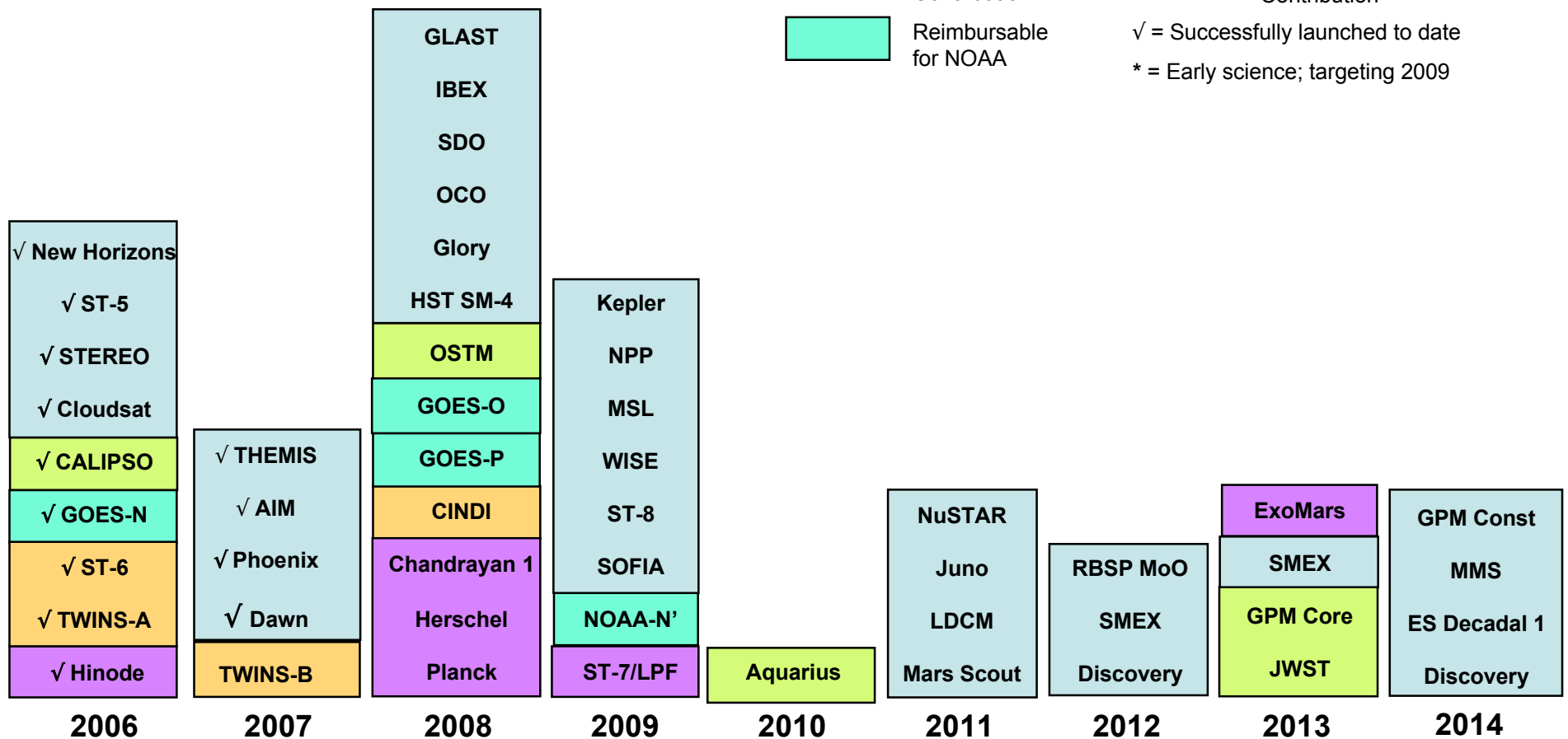
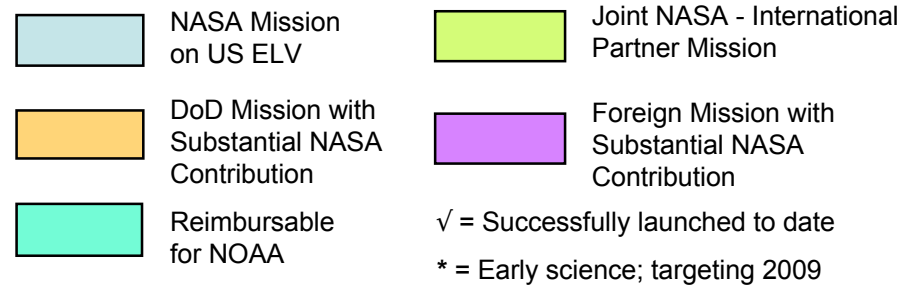
FY2008 SMD Budget by Division (\$M)

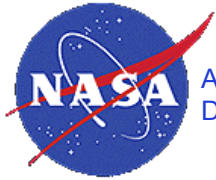




NASA Science Mission Launches (CY06-CY14)

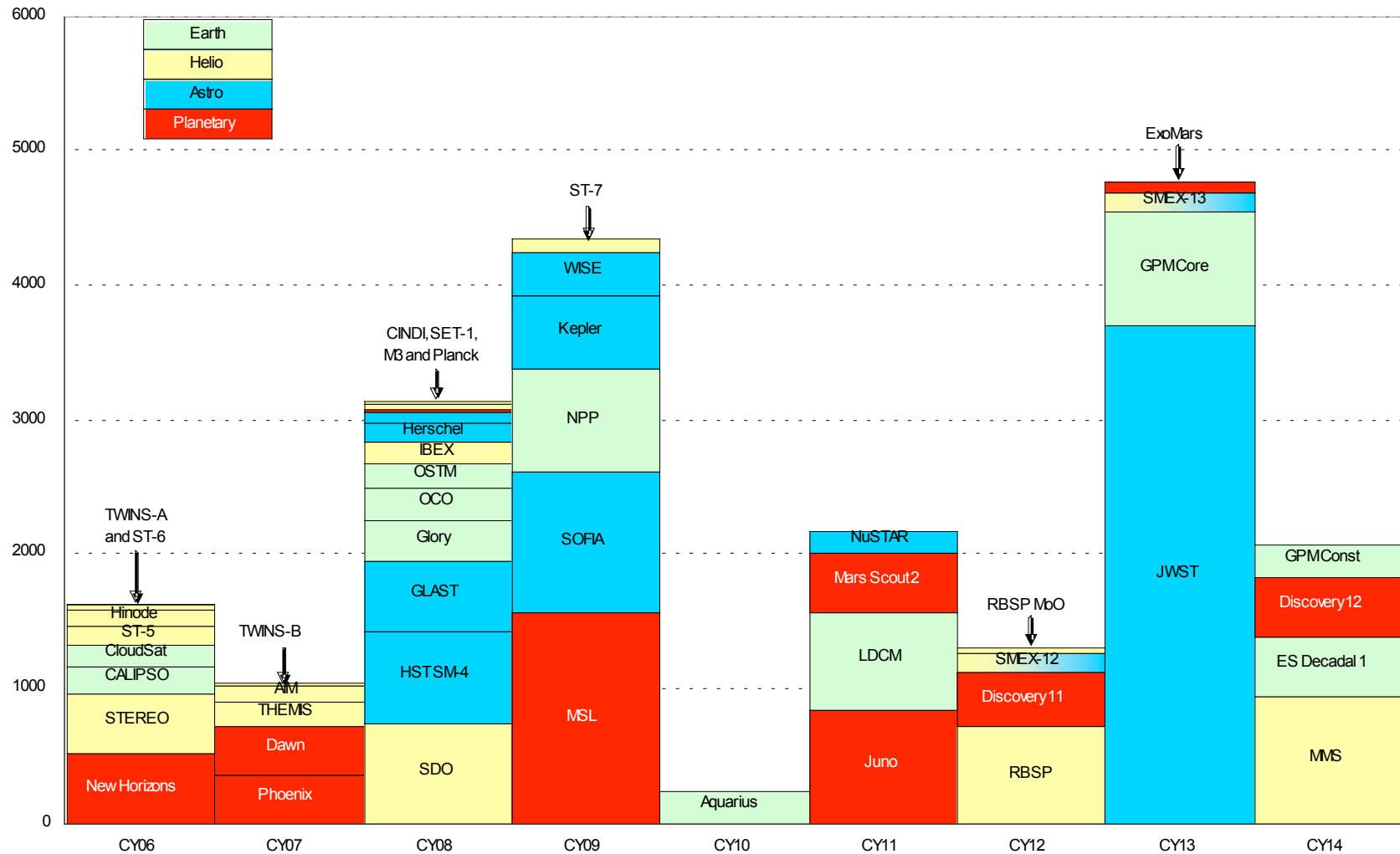
As of 09-25-07





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SMD Launches (Phase A-D, \$M)



October-2007

Astrophysics in The Next Decade



Looking Forward

Fiscal Landscape

- Assumptions
 - Approximately flat Astrophysics Division Budget
 - Currently planned facilities operate at least as long as planned for (but most will likely last longer)
 - Complete current missions in development
 - Basic Research & Analysis (R&A) funding will go up, or at worst remain the same
 - Mission funding profile shapes will resemble those in the past

What Can We Afford?

- Fixed costs for the next 5 years are \$M (FY08)/yr
 - R&A, Mission Data Analysis, Theory: >130
 - Small Mission operations (e.g., GALEX, Swift, etc.): ~ 90
 - Medium Mission operations (e.g., Kepler, GLAST, etc.): ~130
 - Great Observatory operations: ~150
 - JWST development: ~300
 - **Total** **>800**
- Funding available for other things (medium-class missions, Explorers, ...) by the end of the 5 year period ~300
- Balanced portfolio:
 - Reinvigorate R&A, suborbital; Missions of Opportunity
 - Medium class missions with cost envelope ~\$600-700M at ~\$150-200M/year peak requirement
 - E.g., JDEM, exoplanets, US share of LISA, additional Probe-class missions
 - Next >\$1B mission after JWST



Strategic Mission Concepts

- The Decadal Survey Cost Problems:
 - All strategic missions in the 2001 Decadal Survey were severely undercosted
 - Suggested improvements from Decadal Survey Workshop, including more rigorous cost estimation
- Goals of Strategic Mission Concept Studies
 - Develop inputs (not “guidance”) to Decadal Survey by supporting technical work on community investigations and mission concepts
 - Foster partnerships between govt, industry and academia, and build consensus
 - Provide suite of concepts with consistent cost estimation methods that indicate how cost scales with size and complexity



Strategic Mission Concepts

Selection Criteria:

- 1) A clear statement of the scientific objectives and how these are met by the proposed science investigation(s), measurements, and capabilities supported by the mission concept;
- 2) A clear statement of the current readiness levels for mission critical technologies and a rationale supporting the stated readiness levels in the proposal, including, where possible, laboratory or field demonstrations of the technologies;
- 3) A description of the phased mission costs and cost estimation methodology and a description of the technical feasibility of the mission, or a description of the program required to mature mission critical technologies during the next decade; and
- 4) A detailed statement of work to be undertaken over the proposed period of performance (not to exceed twelve months), including the NASA Center's study management costs.



Strategic Mission Concepts

NASA Center Management:

- Center participation could range from:
 - Minimum of coordination role in scheduling Team X or IDC costing effort and monitoring progress of study to meet deadlines for participating in future planning activities
 - Center could perform the bulk of the technical work of the study as well, *but this is not required*
 - There are no restrictions on who can propose and where the work is done; minimum Center coordination role is required along with (fixed) \$200k engineering and costing effort at Team X or IDC
- Full cost to be included within work plan, including Center study management role



Strategic Mission Concepts

Concepts to utilize Exploration infrastructure:

- LVs (Ares 1, Ares 5), human or robotic servicing capabilities
 - Infrastructure
 - Platform
 - Long operational timescales
 - **Doug Craig** from ESMD is available to answer questions
- Why is ~\$600M used as the medium-class mission scale?
 - Balanced portfolio in budget planning out to 2020 and beyond
 - Take significant science and technology steps towards more ambitious missions and goals that current Explorer or Discovery programs cannot accommodate



Strategic Mission Concepts

Schedule of activities:

- Proposals due November 20, 2007
- Proposal reviews ~January 2008
- Astrophysics Division will distribute funds for selected studies as quickly as possible after review
 - Funding is for one year effort
 - Teams are strongly encouraged to accomplish their study activities, including Center costing effort, to be ready to provide inputs to Decadal Survey panels in late-2008/early-2009
- Final concept study reports will be due March 1, 2009
 - In addition to Decadal Survey inputs, studies will inform NASA's formulation of its next Science Plan due in 2009



Conclusions

- Next two years rich in new observational capabilities as missions in development launch
- While constrained, NASA Astrophysics budgets capable of initiating several missions in the next decade
- Increased flight rate through balanced portfolio of small, medium and large opportunities
- The scientific horizon is *exciting* and the future will produce equally stunning results as past performance within a program that is affordable



Backup



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Astrophysics: Content of FY08 Budget

	FY07	FY08	FY09	FY10	FY11	FY12
FY 08 President's Budget	1,563.0	1,565.8	1,304.2	1,268.9	1,266.2	1,393.8
Navigator	124.7	57.1	58.4	59.5	61.0	62.5
SIM	94.2	20.2	20.7	22.0	22.3	22.6
Keck Interferometer / Single Aperture / Ops	10.0	13.0	11.8	10.5	10.3	10.7
TPF	0.0	6.1	6.2	6.3	6.4	6.5
Other Navigator	12.4	13.6	15.4	16.4	17.7	18.3
Institutional	8.0	4.3	4.3	4.3	4.3	4.5
JWST	468.5	545.4	452.1	376.9	321.1	285.9
Direct	391.0	447.5	372.0	311.1	265.1	236.2
Institutional	77.5	98.0	80.1	65.7	55.9	49.7
Hubble Space Telescope	343.0	277.7	165.2	152.8	151.4	151.3
Development	188.9	136.6	45.8	37.6	35.9	35.0
Operations and Data Analysis	95.6	90.0	89.5	88.1	88.9	89.8
Institutional	58.5	51.1	29.9	27.1	26.7	26.5
SOFIA	0.0	77.3	89.1	88.6	89.9	92.1
Direct	0.0	63.1	72.9	72.9	74.1	75.9
Institutional	0.0	14.2	16.1	15.7	15.8	16.2
GLAST	90.7	42.2	28.3	28.3	29.3	30.2
Direct	75.2	34.4	23.2	23.3	24.1	24.9
Institutional	15.5	7.8	5.1	5.0	5.2	5.3
Discovery	105.0	93.0	25.7	16.3	16.2	17.6
Kepler	89.2	79.5	21.4	13.4	13.3	14.5
Institutional	15.7	13.5	4.4	2.9	2.9	3.1
*Astrophysics Explorer	69.4	99.1	88.8	28.2	11.7	5.7
WISE	52.7	72.7	65.2	13.0	5.2	1.6
Swift, Suzaku	9.1	13.1	11.4	11.7	5.1	3.2
Institutional	7.6	13.2	12.2	3.5	1.4	0.8
Astrophysics Research	319.8	315.2	306.1	331.9	378.5	491.4
Research and Analysis	50.0	47.5	48.9	46.2	48.1	49.8
Chandra	61.1	62.9	65.0	67.8	68.5	70.2
Spitzer	76.3	75.4	71.7	48.9	44.3	43.2
Astrophysics Future Missions			0.2	42.7	78.1	164.6
Other Operating Missions / D A / Archives	67.8	60.0	50.9	50.7	55.5	58.6
Balloons	19.8	22.0	24.1	23.9	23.8	25.1
Institutional	44.8	47.4	45.3	51.8	60.1	79.7
ISSC	19.8	26.5	39.1	38.7	36.5	35.2
Herschel & Planck	18.5	24.8	36.6	36.3	34.2	33.0
Institutional	1.3	1.7	2.5	2.4	2.3	2.2
Beyond Einstein	22.1	32.3	51.5	147.6	170.6	222.1
Direct	18.3	26.5	42.3	121.5	140.7	183.2
Institutional	3.8	5.8	9.2	26.1	29.9	38.8

October-2 *Future Explorer (non-add; in Heliophysics) 9.1 11.6 47.8 110.4 154.3 172.5

OSTP-OMB FY08 budget overview for SSB, March 2007

Total NASA Budget (\$17.3 billion requested for FY08)

